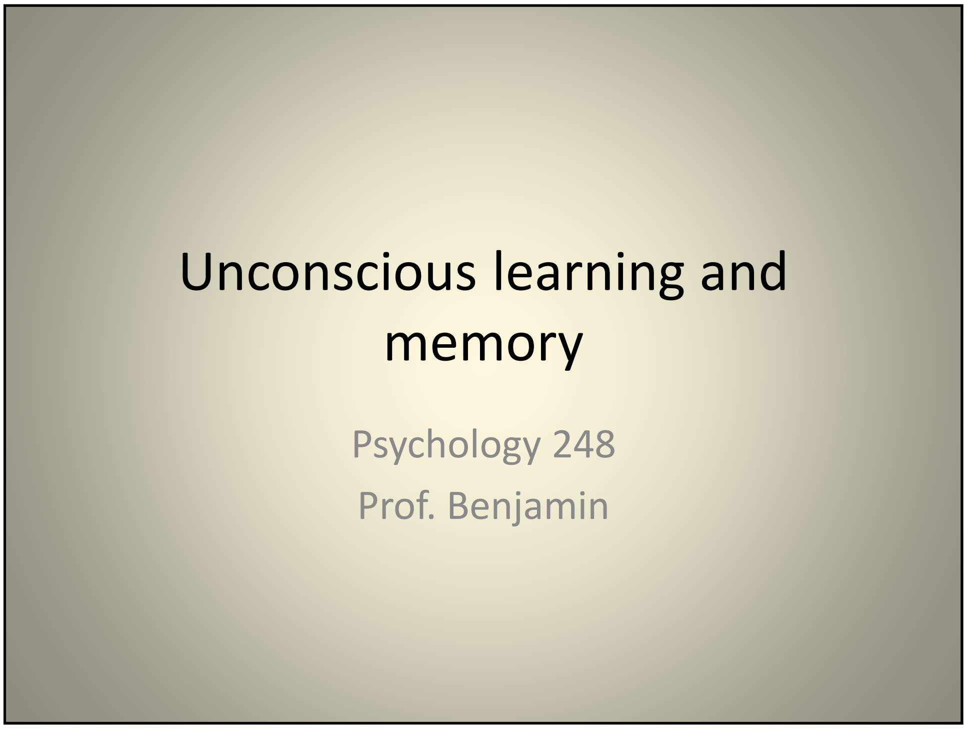
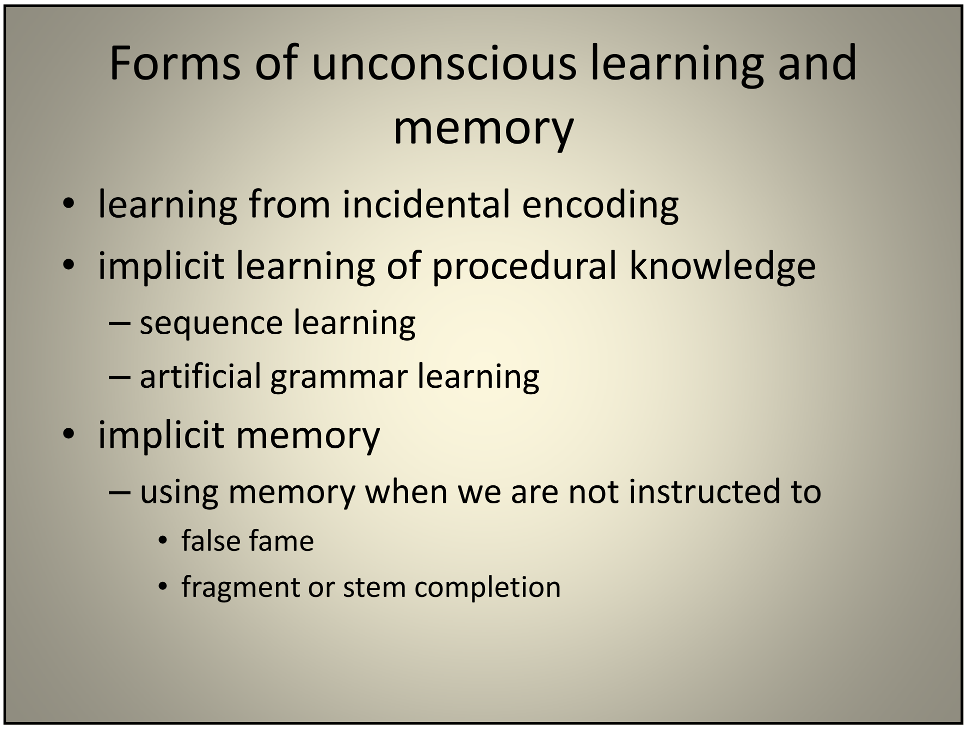


Unconscious learning and memory

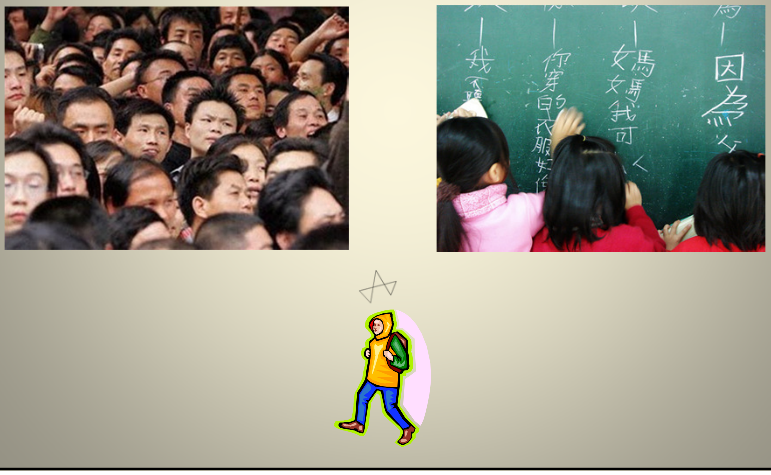
Psychology 248
Prof. Benjamin



Forms of unconscious learning and memory

- learning from incidental encoding
- implicit learning of procedural knowledge
  - sequence learning
  - artificial grammar learning
- implicit memory
  - using memory when we are not instructed to
    - false fame
    - fragment or stem completion

Incidental vs. intentional learning in language acquisition



Intentional vs. incidental learning

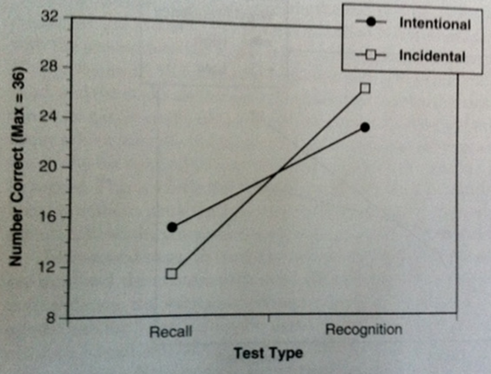


Figure 9.3 The interaction between learning instructions (intentional versus incidental) and test type (free recall or recognition).
SOURCE: Eagle & Leiter (1964).

Serial pattern learning task

```
ABCD
__*_
___*
*___
*___
_*__
__*_
__*_
___*
*___
___*
_*__
___*
__*_
___*
*___
*___
_*__
__*_
```

Serial pattern learning task

```
ABCD
__*_
___*
*___
*___
_*__
__*_

__*_
___*
*___
*___
_*__
__*_

__*_
___*
*___
*___
_*__
__*_
```

Serial pattern learning task

repeated sequence

random control

ABCD	ABCD
__*_	__*_
___*	___*
*___	*___
*___	*___
_*__	_*__
__*_	__*_
__*_	__*_
___*	*___
*___	*___
*___	___*
_*__	_*__
__*_	___*
__*_	___*
___*	*___
*___	_*__
*___	_*__
_*__	___*
__*_	__*_

Procedural knowledge in serial pattern learning task

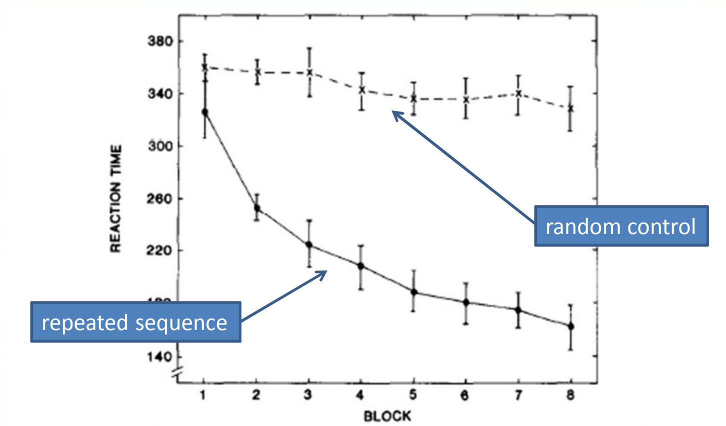


FIG. 1. Mean of median reaction time in milliseconds in each block of Experiment 1. Filled circles: repeating sequence; ×'s: random sequence. Bars represent standard errors.

Nissen & Bullemer (1987)

Amnesia and procedural learning

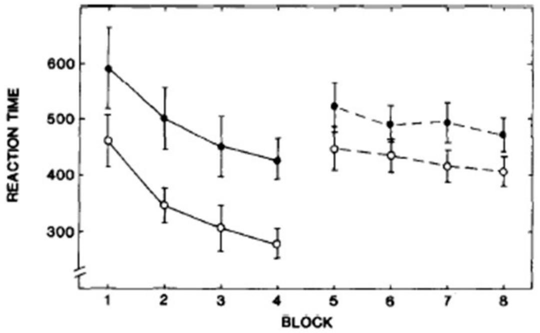
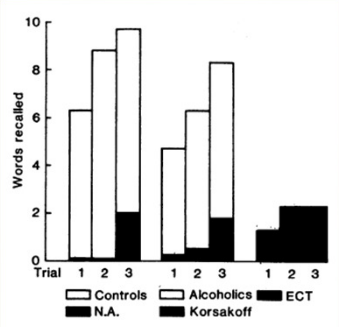


FIG. 8. Mean of median reaction time in milliseconds of six Korsakoff patients (filled circles) and eight healthy age-matched control subjects (open circles). During Blocks 1–4 all subjects received the repeating sequence (solid lines); in Blocks 5–8 they received the random sequence (dashed lines). Bar represent standard errors.

Nissen & Bullemer (1987)

Declarative vs. procedural knowledge

Evidence from amnesics (Cohen & Squire, 1980)



Memory for words

Reading inverted text →

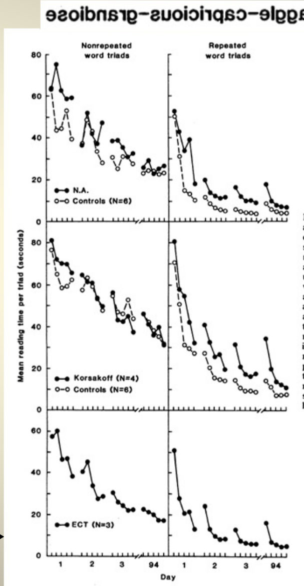


Fig. 2. Acquisition of a mirror-reading skill during three daily sessions, and retention 3 months later. The ability to mirror read unique (nonrepeated) words was acquired at a normal rate by amnesic patients. The ability of amnesic patients to mirror read repeated words was inferior to the control rate because amnesic patients, unlike control subjects, could not remember the specific words that had been read.

Explicit knowledge and pattern learning

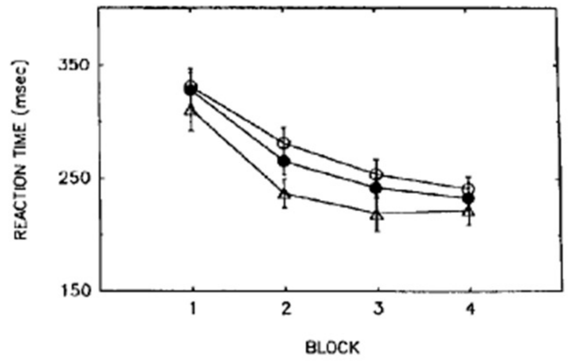
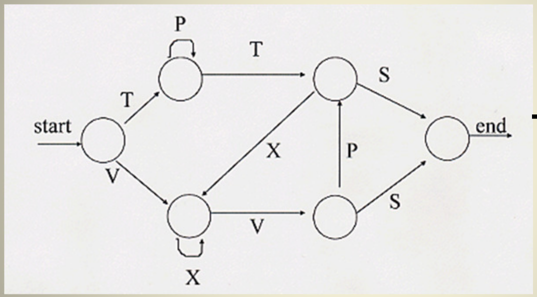


Figure 2. Mean of median reaction time in milliseconds in Blocks 1–4 of Experiment 1 following exclusion of all anticipatory responses ($RT < 100$ ms). (Open circles = no explicit knowledge; filled circles = some explicit knowledge; open triangles = full explicit knowledge.)

Willingham, Nissen, & Bullemer (1989)

Implicit learning

Artificial grammar learning



Reber (1967)

VVS
TPPTS
TPTXXVPS
VVPS
TPPPTS
VXXVS

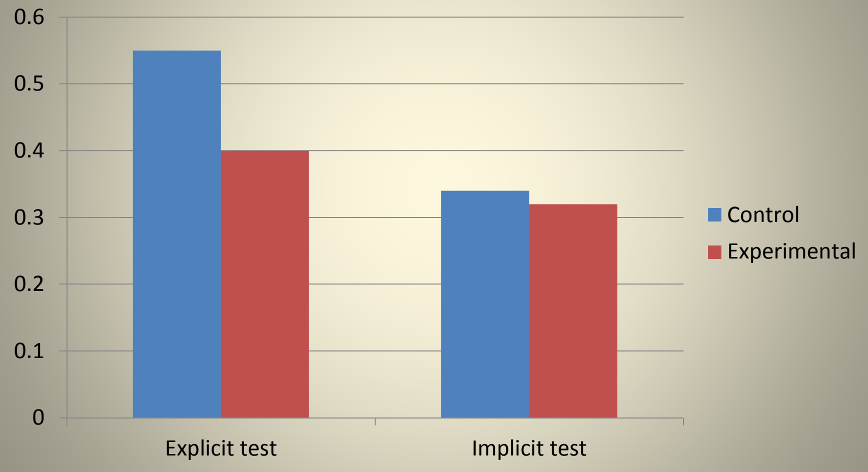
Implicit memory

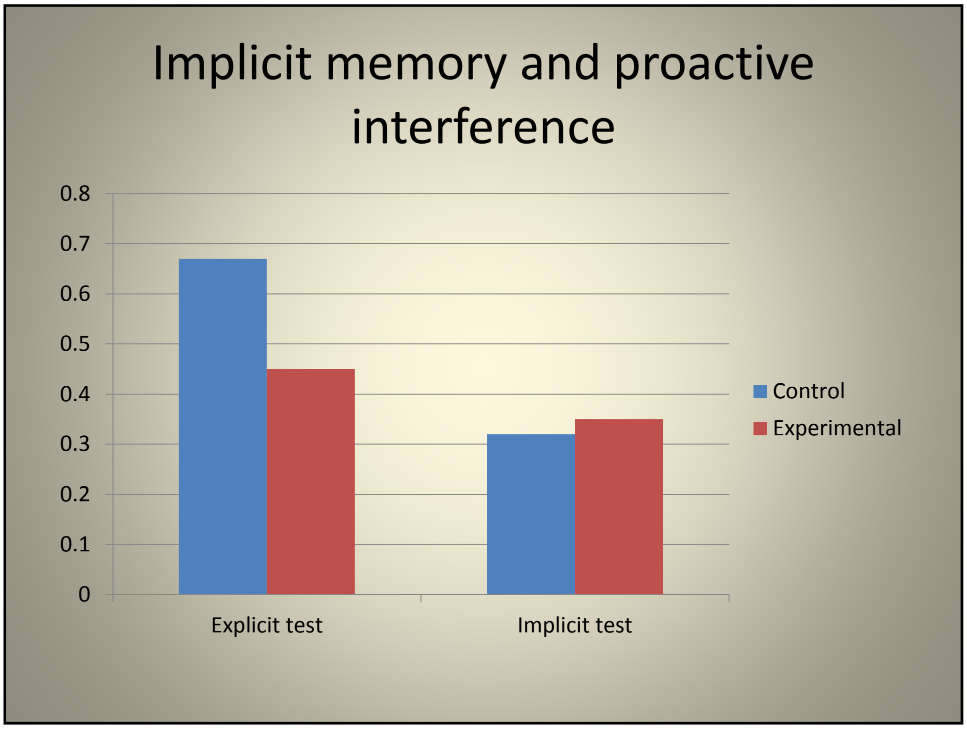
	Phase 1	Phase 2	Test	Interference
RI Control	A-B	C-D	A-B	
RI Experimental	A-B	A-D	A-B	Retroactive
PI Control	C-D	A-B	A-B	
PI Experimental	A-D	A-B	A-B	Proactive

- encoding pairs of words
- form sentence from those pairs
- two memory tests
  - explicit – cued recall of B given A
  - implicit – stem completion of B given A and a few letters of B

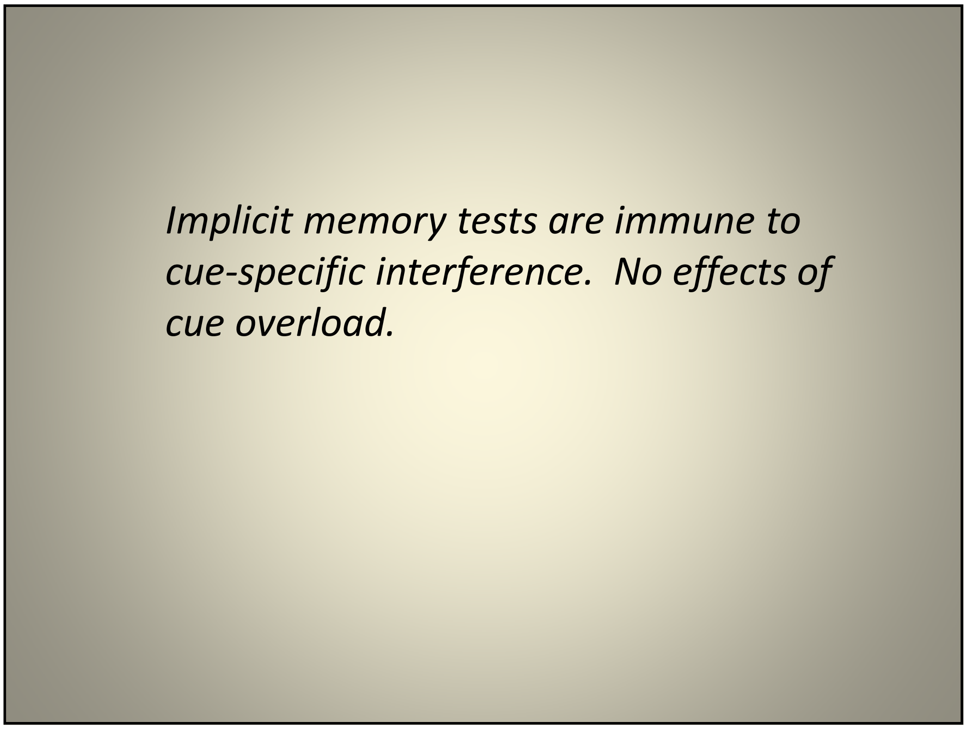
Graf & Schacter (1987)

Implicit memory and retroactive interference



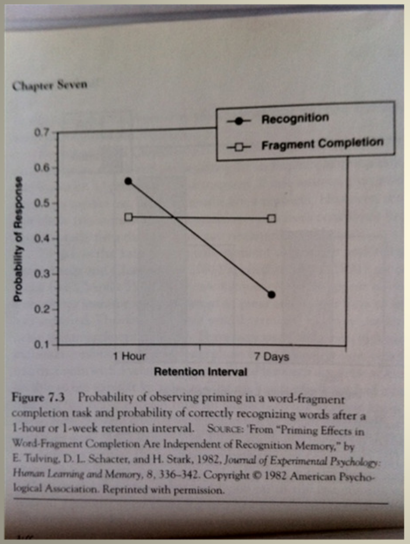


Implicit memory and proactive interference



Implicit memory tests are immune to cue-specific interference. No effects of cue overload.

Rate of forgetting



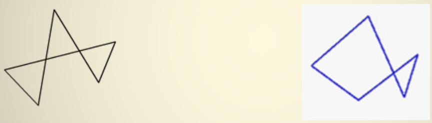
Chapter Seven

Figure 7.3 Probability of observing priming in a word-fragment completion task and probability of correctly recognizing words after a 1-hour or 1-week retention interval. SOURCE: 'From "Priming Effects in Word-Fragment Completion Are Independent of Recognition Memory," by E. Tulving, D. L. Schacter, and H. Stark, 1982, *Journal of Experimental Psychology: Human Learning and Memory*, 8, 336–342. Copyright © 1982 American Psychological Association. Reprinted with permission.

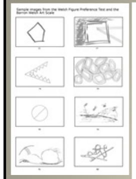
Tests of *implicit memory* reveal slower forgetting

Tulving, Schacter, & Stark (1982)

Which shape do you prefer?



Mere exposure effect



Welsh figures

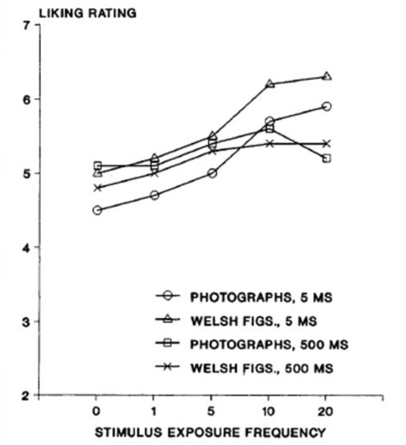


Figure 3. Effects of stimulus type and exposure duration on liking ratings of merely exposed stimuli (Experiment 2). (FIGS. = figures.)

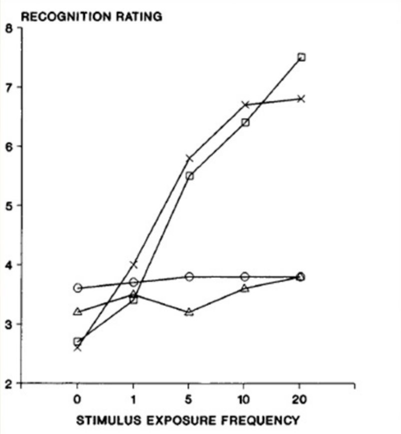


Figure 4. Effects of stimulus type and exposure duration on recognition ratings of merely exposed stimuli (Experiment 2). (FIGS. = figures.)

Zajonc (1968)

Bornstein & D'Agostino (1992)

Do we understand our own mental processes?

snake-phobic subjects

SHOCK! → shock ← tones presented that increase in frequency ONLY when the word SHOCK! appears.

Experimental group: told that the tones are a measure of their heartbeat
Control group: told that tones are random

TEST: after all of this, who is willing to touch a live boa constrictor?

Valins & Ray (1967)

Next class:
Aging and memory